

Pediatric Disaster Medicine

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Faculty

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Objectives

- Review relative risk related to demographics of pediatric population and pediatric medical capabilities and capacities
- Review clinical perspective for pediatric disaster planning and response using resource supply and demand analysis
- Review administrative, public health, and clinical management reference frames

Pediatric Demographics

General Medical Demographics

- Many locales in US are seeing serious capability and capacity issues nearly daily
 - Overcrowding and boarding of patients in Emergency Departments is common
 - Shortfall of ICU beds
 - Shortfall of on-call specialists
 - Financial strain

Pediatric Demographics

- Infants, children, and adolescents comprise about 20-25% of the general population in most locales in US.
 - 20-25% of victims related to disaster events that evenly or randomly affect the general population will likely be in the pediatric age range

Pediatric Demographics

- Disaster events that affect clusters of children will produce nearly 100% pediatric aged victims
 - Daycare or school events
- Mechanisms of illness or injury that preferentially impact children will also produce more pediatric victims

Pediatric Medical Demographics

- Pediatric medical capacity is more constrained than adult capacity
 - About 5000 hospitals exist in US
 - Less than 10% of hospitals provide moderate to high level care for children

Pediatric Medical Demographics

- A significant number of hospitals could provide interventions to older children and adolescents but choose not to do so
- Significant distance usually separates tertiary pediatric medical facilities

Pediatric Medical Demographics

- Pediatric medical capacity is more constrained than adult capacity
 - Pediatric specialists are in short supply
 - Many pediatric facilities operate at near capacity much of the time
 - A small extra influx of cases can exceed capacity

Pediatric Medical Demographics

- Medicaid and SCHIP pay for significant amounts of pediatric medical care
 - Both often pay clinicians significantly less than Medicare for similar services

Pediatric Medical Demographics

- Private insurance usually pays the same for pediatric and adult services
- There can be problems crossing state lines related to reimbursement

Pediatric Medical Demographics

- Number of pediatric patients with significant chronic medical conditions is steadily increasing because of medical and surgical advances in recent years

Pediatric Medical Demographics

- Non-disaster related cases require care during disasters
 - Depending on the context, non-disaster related cases often will be more numerous and require more resources than disaster related cases

Resource Supply And Demand Analysis

Resource Management

- Disaster state is well defined and in resource management terms
 - Disaster is the state when supply of resources is insufficient to meet need for resources

Resource Management

- One of the most effective and efficient and rigorous methods to analyze and respond to a disaster is to understand and methodically optimize the cofactors that determine supply and demand for the pertinent resources during a disaster

Security/Protection

- Security/protection should always be first priority and is required to enable all other efforts

Co-factors Determining Resource Supply and Demand

- Supply
 - Security / protection
 - Human resources
 - Supplies
 - Equipment
 - Facilities

Co-factors Determining Resource Supply and Demand

- Money
- Process design and execution
- Policy and regulation
- Inventory
- Transportation

Co-factors Determining Resource Supply and Demand

- Demand
 - Security/protection
(‘Decontamination’ policy)
 - Baseline requirements
 - Disaster requirements
(Attack rate x insult type x referral area)
(Complication rates)

Co-factors Determining Resource Supply and Demand

- Policy and regulation
(Treatment policy)
- Process design and execution

Resource Supply and Demand Management

- Supply side options → INCREASE SUPPLY
 - Transport victim to location where supply is adequate
 - Transport supply to victim’s location

Resource Supply and Demand Management

- Demand side options → DECREASE DEMAND
 - Reduce baseline demand
 - Offload baseline demand
 - Temporize baseline demand until supply becomes adequate

Resource Supply and Demand Management

- Reduce disaster related demand
 - Reduce attack rate/insult type/ area of responsibility
 - Temporize to reduce immediate demand and definitely resolve when supply becomes adequate
- Triage/ration

Supply and Demand Co-factor Management

- Managing and optimizing each of the cofactors listed (and any others pertinent to a given context) will optimize the overall disaster response
- Communications and information systems will enable these efforts

Supply and Demand Co-factor Management

- Command and control organization will also enable these efforts
 - HEICS/other schemes may need to be task adjusted to better serve pediatric and other contexts

Supply and Demand Co-factor Management

- HEICS/other schemes may facilitate interagency communication and efforts but may or may not be best for intrahospital or other internal medical organization

Supply and Demand Analysis

- Often it is more useful and efficient to think and work in terms of functional resource items rather than elemental resource items
 - For example, say we need to perform internal abdominal surgery (celiotomy) on an injured victim

Supply and Demand Analysis

- The elemental approach would be to look for a surgeon and then an anesthesiologist and then an available OR, etc.
- The functional approach would be to look for a celiotomy

Pediatric Issues

- Pediatric patients have some special resource issues
 - Size and developmental physiology issues
- Need broad spectrum of equipment and supply sizes for infants, children and adolescents

Pediatric Issues

- Need providers, equipment, and supplies to accommodate spectrum of developmental physiology of pediatric cases (i.e. infants cannot swallow pills)
- Family/caregiver issues
- Infants and younger children require a caregiver

Pediatric Issues

- Family separation is an important issue
- Possibly others

Reference Frames For Disasters

Reference Frames

- Administrative
 - Focuses on managing resources
 - Resource management process and financial management
- Clinical
 - Focuses on applying resources (clinical fulfillment process) to patients

Reference Frames

- Public Health
 - Focuses on applying resources to populations
- Political?
- Each of these reference frames is interrelated but will give somewhat to significantly different solutions to the same context

Reference Frame Divergence

- For example, consider recent H1N1 influenza outbreak
 - Administrative reference frame was how to supply sufficient clinic visits, infection control masks, flu tests and oseltamivir
 - Some chose to divert profound resources to H1N1 issues

Reference Frame Divergence

- Public health reference frame at one point suggested patients with flu like illness and negative rapid flu test should be tested for H1N1
 - This improved public health understanding of H1N1

Reference Frame Divergence

- The clinical reference frame at same time was that most patients did not require care and for those that did how to decide whether or not to treat patient with oseltamivir or other interventions
 - Rapid flu test was too inaccurate
 - H1N1 test took many days

Reference Frame Divergence

- So clinicians had to abandon testing and treat just on presence of flu symptoms
 - Additional pediatric issue was whether or not to treat infants with unapproved drug
 - Also had shortfall of liquid oseltamivir